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CONTENTS.

	Page
Cotton-Seed Dermatitis and its Cause, Pediculoides Ventricosus. By J. A. NIXON, M.B. Cantab., F.R.C.P.	73
Neuritis: Its Definition and Successful Treatment. By NAUNTON DAVIES, F.R.C.S.	81
Women Doctors with the Army in the Field. By HELEN B. HANSON, M.D., B.S.Lond.	88
The Clinical Examination of Stools. By G. HELY-HUTCHINSON ALMOND, M.A., B.M., B.Ch. Oxon., M.R.C.S. Eng., L.R.C.P. Lond.	95
Progress of the Medical Sciences:	
Medicine	108
Reviews of Books	114
Obituary	123
Local Medical Notes	126

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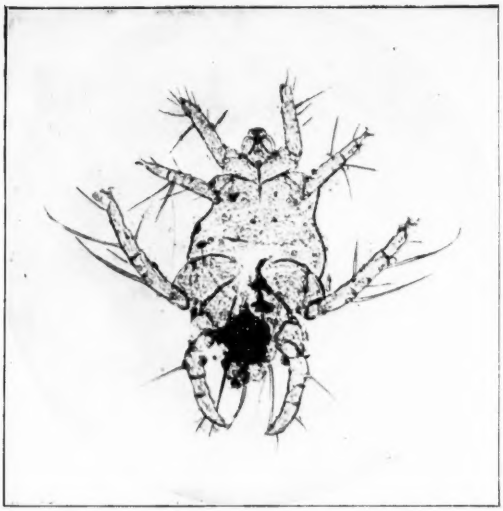

Fig. 1.—Male (×44). Ventral surface, showing sclerites at base of limbs. Note that first and last pair of appendages are clawed.

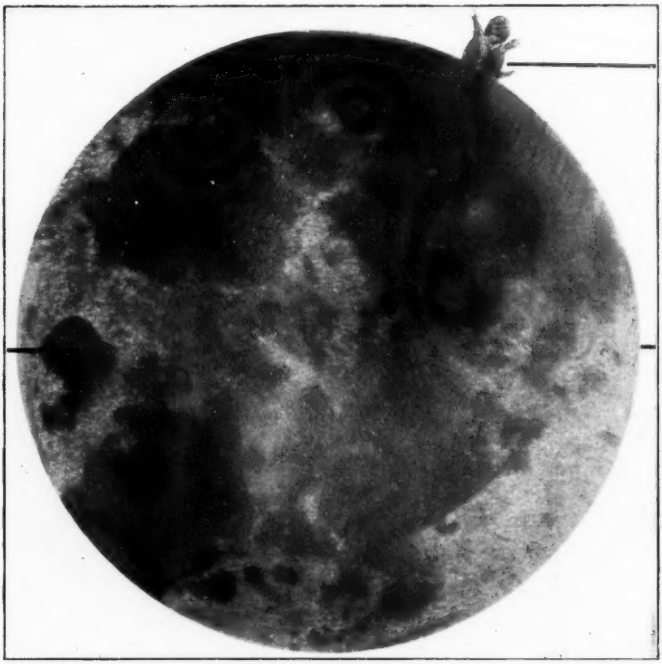

Fig. 2.—Female, impregnated (×70). Showing A, cephalothorax; B, abdomen enormously distended; C, a clump of developing eggs (the numerous dark patches seen in the abdomen are similar clumps).

The Bristol Medico-Chirurgical Journal.

" Scire est nescire, nisi id me
Scire alius sciret."

JUNE, 1915.

COTTON-SEED DERMATITIS AND ITS CAUSE, PEDICULOIDES VENTRICOSUS.

BY

J. A. NIXON, M.B. Cantab., F.R.C.P.,

Captain, R.A.M.C.(T.), Second Southern General Hospital; Physician in Charge of Skin Department, Bristol Royal Infirmary; Clinical Lecturer in Dermatology, University of Bristol.

SOME years ago Dr. Kenneth Wills[1] published an account of an outbreak of " barley itch " amongst some of the dock labourers in Bristol engaged in discharging cargoes of barley. A full description of the disease is given (with a good bibliography) in Stelwagon's *Diseases of the Skin*,[2] and Shipley[3] refers briefly to it in his *Minor Horrors of War*.

The eruption in " barley itch " is believed to be due to the bite of a " mite " called *Pediculoides ventricosus*.

[1] *British J. Derm.*, Aug., 1909.

[2] Stelwagon, *Treatise on Diseases of the Skin*, Seventh Edition, 1914, p. 1183.

[3] Shipley, *Minor Horrors of War*, 1915.

An outbreak of a somewhat similar nature has recently been the subject of investigation, occurring at the Avonmouth Docks amongst dockers who handled cargoes of cotton seed. The Medical Officer of Health for Bristol, Dr. D. S. Davies, first drew my attention to this outbreak at the end of 1914, and the Health Office endeavoured, without success, to find a patient who displayed the rash in an early stage and unattended by scratching and secondary infection.

In January, 1915, however, the Secretary of the Dockers' Union was able to bring under my observation a man whose eruption had only just appeared.

T. T., a healthy dock labourer, aged 42, had enjoyed good health all his life, and had only drawn six weeks' sick pay from his club in fourteen years. He was not liable to food rashes, and presented no sign of scabies or body-lice. His history of the present condition was that three days before seeing the exhibitor he had been at work unloading a cargo of cotton seed (in bulk) from Alexandria. Within a short time of starting work on the cotton seed the patient began to feel some irritation about the neck and arms. This irritation increased, and became most severe during the following night when he got warm in bed. At first no rash could be seen, but towards evening a series of red spots, about the size of mosquito bites, appeared at the site of the irritation. Some of the spots developed " bladders " upon them, which burst and discharged a watery fluid. He had previously had similar attacks, the first occurring some four or five years ago, but the present attack was the worst he had suffered from. The patient stated that he had developed a somewhat similar eruption from working in " itchy " barley.

The rash died out in a week if not renewed by continued work in the " cotton seed," or unless it was " scratched and poisoned," when a " sort of eczema set in." The rash did not appear on the covered parts of the body. The spots were not transient or recrudescent. There must be actual contact with the seed before the itching started; mere entrance into the place where the seed was stored did not cause any itching. It was only certain cargoes of cotton seed which were " itchy "; the men thought that the " itchy " cargoes were those which came from Alexandria; there had been no complaints with those from Smyrna. But cotton seeds if in bags did not seem harmful; it was only when handling cotton-seed cargoes " in

bulk " that the " itch " occurred. Of fifty men working on this cargo about two-thirds had been attacked.

The eruption consisted of sparsely-distributed, isolated urticarial papules situated chiefly on the neck and forearms with a few papules on the legs. Each papule was pinkish-red in colour, hard, raised and about the size of a pea. In its general appearance the rash resembled a moderately severe attack of lichen urticatus in a child. There were no burrows of the *Acarus scabiei* to be seen.

Fortunately I was able to get fresh supplies of the cotton seed in which numerous live " mites " were readily seen under the low power of the microscope. These resembled fairly closely the *Pediculoides ventricosus* as figured in Stelwagon, although no examples of the gravid female (from which this mite derives its distinguishing name) could be found. The cargo had only recently been discharged from the hold, and probably offered a warm habitation to the insects, as three days' exposure of a small sample to the cold left none of them alive.

It appears that the " mites " do not tend to become parasitic on man. None of the workers who were attacked complained of being bitten afresh in their own homes, nor did the disease spread to any members of their families.

Dr. MacLeod,[1] in discussion at the Dermatological Section of the Royal Society of Medicine, expressed the opinion that these " mites " of cotton-seed dermatitis were parasites of a caterpillar of the cotton moth (*Gelechia gossypiella*), which he and Colonel Alcock had found present in a cargo of cotton seed that had caused a similar dermatitis at the London Docks about eighteen months previously.

In the first specimens of cotton seed from the Avonmouth and Bristol Docks no traces of this moth or its caterpillar were discovered by Dr. Henderson. In the later samples, however, the caterpillar was frequently

[1] *Proc. Roy. Soc. Med.*, 1915, viii. 112.

discovered coiled up in a hollow seed which it had eaten out. In these samples many gravid females were found, proving conclusively that the "mite" is the *Pediculoides ventricosus*. The illustration given in Stelwagon (from Laboulbène and Mégnin) does not quite bring home the extraordinary disproportion in size between the non-gravid and the gravid female.

Dr. W. D. Henderson, Lecturer in Charge of Department of Zoology, University of Bristol, has kindly examined and reported on the cotton seed and the "mite" found in it.

The following account is based on material obtained from cotton seeds taken from the S.S. *Andromachis* :—

The cotton seeds were examined immediately on arrival in the laboratory, and were found to be richly infested with the "mite." They were moving about in a rather lethargic way, and a number of preparations were made.

In order to see if heat had any effect on the specimens the seeds were collected in a sample bag, and placed in an incubator which had a constant temperature of 33° centigrade. Exactly twenty-four hours afterwards the seeds were again examined, and instead of the slow movements of the "mites" previously noticed, they were now found to be vigorously and rapidly moving on the slide, and it was from this material that the best specimens were obtained.

A number of living and active specimens were selected under the binocular microscope and placed in a large drop of 50 per cent. glycerine at 10.0 a.m. on June 18th, and were examined twice daily for twelve days. At 5.0 p.m. on the twelfth day they were still moving their legs fairly actively at times, and at other times lying quite still. On the thirteenth day I was unable to examine them, but at twelve noon on the fourteenth day they were quite motionless. The glycerine, as far as I could judge by testing with litmus paper, was neutral.

This suggests that we are dealing with a highly-resistant form, and one that is likely to resist all attempts at treating the cargo in bulk with an insecticide which would be effective, and at the same time possible on the score of expense.

The animal is elongated and flattened dorso-ventrally, with an average length of 0.16 mm. and an average breadth of 0.062 mm. It is sharply pointed at the anterior end and more

rounded at the posterior in the female, more truncated in the case of the male.

The impregnated female often reaches a length of 1.3 mm. This increase is entirely due to the large swollen globular abdomen, which varies in diameter from 0.8 mm. to 1.5 mm. Several of the specimens reached a length of 1.6 mm., of which the swollen abdomen was fully 1.5 mm. in length.

There are four pairs of walking legs on which there are bristles, which are apparently more numerous on the female than on the male.

The body of the animal is soft, but there are several sclerites present, especially on the ventral surface at the points of insertion of the appendages.

On the dorsal surface three shallow transverse grooves are visible, thus dividing the body into four distinct regions. On the ventral surface the body is marked out into a number of regions, one fairly large quadrilateral region at the base of each of the four anterior walking legs. These are separated off from one another by a median groove which does not quite reach the posterior margin of the hinder area of the two, but at its anterior end it bifurcates and curves gradually round till each arm reaches the margin, thereby separating off a small area which lies at the base of the pedipalps.

At the base of each of the four posterior legs there is also a distinct area marked off, but these differ in shape from the areas associated with the anterior walking legs. At the base of each of the third pair there is a large, more or less, oval-shaped area, which does not meet its fellow in the middle line. Each of the fourth pair has a much smaller triangular-shaped area, which also does not join its fellow. Behind this there is a partially differentiated area on each side which can be traced about half-way towards the middle line.

The areas at the base of the third and fourth pairs of walking legs show a tendency to be divided up into a median and a smaller lateral area.

The cephalothorax is marked off from the abdomen, but their line of demarcation is by no means very distinct.

The two anterior pairs of walking legs rise fairly closely together, just behind the basal ends of the mouth parts. Then there is a considerable gap, and the two posterior pairs rise close together a short distance from the posterior end of the animal.

The walking legs are six-jointed. The first pair tapers less than the others, and differs slightly in the distal joint, which is haired and clawed. The remaining pairs are longer and more slender, and the tarsal joint is much narrower than the other joints, and has a peculiar cone-shaped swelling at its end.

About half-way up the tarsal joint there is a pair of peculiar lateral outgrowths which gives the tarsus a †-shaped appearance.

In the males the last pair of walking legs is also clawed.

The chelicerae are apparently reduced to stylet-like structures which are capable of protrusion. The pedipalps are also greatly modified and partially fused with the maxillary plate, and terminate in a hard, clawed lip.

There are two well-marked tracheæ which are coiled and arranged more or less symmetrically near the margins of the body. There is near the base of the first pair of walking legs a peculiar structure which, running obliquely forward on each side, reaches the exterior near the base of the pedipalps. This in our previous account was considered as either a modified anterior portion of the tracheæ, as by focussing at different levels it seemed to be continuous with the tracheæ, or as the pseudo-stigmatic organs. While still doubtful as to the real nature of these structures, it seems more probable that they are the pseudo-stigmatic organs or a modification thereof.

The internal structure, as far as can be made out, does not differ to any extent from the published account given in most text-books.

The hairs on the body and appendages :—

(*a*) On the body there are usually five pairs of hairs. Four pairs are borne on the thoracic portion and one pair rises close to the posterior end of the abdomen. Occasionally there are fewer pairs visible, but this may possibly be due to the specimens being damaged in the handling of the cargoes from which the material was obtained. One point of considerable interest is that in none of the pregnant females can I find any trace of the last pair of long hairs which rise near the posterior end of the abdomen in the males and non-pregnant females.

(*b*) In the female on each joint of the walking legs there is a pair of stiff hairs. The first pair of walking legs has a number of hairs on its distal joint.

In the male the hairs on the joints of the walking legs are shorter and more slender, but in addition to these there is on each walking leg a pair of longer and stouter hairs. These hairs, which are so conspicuous on the first pair of walking legs, are present only on one side of the limb, and arise one from each of two adjacent joints.

The distal joints of the first pair and of the last pair of walking legs are similar to those joints in the first pair of appendages of the female.

There is one fact in connection with *Pediculoides* that is too often overlooked, namely that both in its young and adult stages it lives on the larvæ of different insects. This is fully

brought out by the present material, as the most abundant supply of specimens was obtained from seeds the interior of which had been destroyed by a caterpillar-like larva. These larvæ were unfortunately dead, and in most cases badly damaged, so that they could not be run down to any group, but it is quite possible that they may be the larvæ of the cotton moth, as Dr. MacLeod suggests.

The classification of the *Acarina* is in a very unsatisfactory state, although well-known arachnologists have tried to reduce it to some order. With regard to the affinities of the various groups widely divergent views are held. a state which is not at all conducive to any definite result being reached in the classification. More unfortunate still is the fact that there is little agreement among the workers as to the relative value of the characters upon which the classification is based. The result is that one authority gives thirty-four families, while another equally important authority gives only ten.

The specimen in question, *Pediculoides ventricosus*, belongs to the *Tarsonemidæ*, and is placed in a special sub-order of its own on the one hand, on the other it is classed along with the *Trombidiidæ*.

It is probable that for some considerable time yet it will be most satisfactory from the practical point of view to draw up a purely artificial classification which will have less than thirty-four and more than ten families. If this is done, the increasing importance of these *Acarina*, both from the medical and the legal aspect, will no doubt set some workers going to decide which are harmful and which are not. This is the type of work that will eventually lead to a proper classification.

Dr. A. E. Shipley having expressed his interest in this new "minor horror," kindly submitted a specimen to Mr. C. Warburton, of Cambridge, who writes of it thus :—

"I think Dr. Nixon may have got the culprit. It is so excessively small that unless alive it would be very hard to find. His mite is one of the Tarsonemidæ. Banks[1] quotes Karpelles as saying of a mite of the same group infesting barley in Russia, 'The men had been handling barley, and the mites spread from this to the hands, when they caused an irritating inflammation of the skin so intense as to force the men to leave their work.'"

In May, 1915, another outbreak of cotton-seed dermatitis was reported to me by Dr. D. S. Davies, who had been

[1] *Treatise on the Acarina*, p. 77.

consulted by Dr. W. M. Hope, Medical Officer of the Port of Gloucester.

In June, 1915, I had the opportunity of visiting two steamers in the Bristol Docks where cargoes of cotton seed were discharging. The cotton seed was in bulk in the hold, and nearly all the men working on it were severely bitten on the arms and neck. The eruption was quite uniform, and of papulo-urticarial nature, resembling that described earlier in this paper in the case of the man T. T. I was on board the steamers for a considerable time with cotton seed all round and strewn about the deck, but as I refrained from handling the cotton seed I escaped without being attacked with any irritation, and apparently without being bitten.

The men engaged on these cargoes told me that they had noticed a peculiarity in the " itchy " cotton seed which was new to them, and in their minds was the cause of the " itchiness," namely, that a very large number of the seeds were hollow, and contained a worm or maggot. Up to the present I cannot trace any connection between the maggot and the mite, unless Dr. MacLeod's suggestion is the correct one that the *Pediculoides ventricosus* is a parasite of the caterpillar of the cotton moth, and these " maggots " which the men referred to are in reality this caterpillar.

The occurrence of these minor disablements is of increasing importance since the passing of the National Insurance and the Workmen's Compensation Acts.

The working man attacked by cotton-seed dermatitis claims that he is incapacitated by an injury or disease caused by or arising out of his employment.

The dermatitis itself is no great disablement, but a secondary infection or resulting eczema may prove long-lasting and intractable.

In the interest both of the labourer and the employer it is advisable to render work of this sort innocuous. It is

not yet clear how this should be achieved, but the suggestion that dermatitis does not occur when the cotton seed is packed in bags is worthy of attention.

The cotton-seed mite seems to require a considerable degree of warmth, and quickly succumbs to exposure to the cold of an English January.

The illustrations in this article are from actual photo-micrographs taken by Dr. Henderson, who, in spite of great difficulties, has obtained exceptionally good representations of *Pediculoides ventricosus*.

NEURITIS: ITS DEFINITION AND SUCCESSFUL TREATMENT.

BY

NAUNTON DAVIES, F.R.C.S.,

Llandrindod Wells.

FOR practical purposes I should define neuritis as: "Pain in one or more nerves due to changes—morbid conditions—in the nerve or nerves at the seat of pain, and not to general or remote causes." By the *seat of pain* I mean the actual site of mischief, and not any part of a nerve sympathetically affected.

I propose placing in a separate class those cases of nerve disturbance due to general or remote causes, under the term "pseudo-neuritis," or, if it is preferred, "sympathetic neuritis." As examples of pseudo-neuritis I may refer to the lightning pains of locomotor ataxia in the limbs (due to a remote cause), and to the burning, shooting pains often met with in diabetes (due to a general cause, toxæmia). Cancer supplies another instance of this class of neuritis. Curiously enough, the pain of neuritis associated with cancer is aggravated by the treatment which cures true neuritis; and this phenomenon enables one to diagnose cancer long before any visible sign of that disease manifests itself. One of the

worst forms of pseudo-neuritis we find associated with Hodgkin's disease.

No single method of treatment can be applied in these cases, which need, of course, individual study and special attention.

Then there are cases due to the direct pressure of bony growths or tumours upon nerves, the treatment for which is too obvious to need remark.

After excluding these cases of pseudo-neuritis, there remain the cases I shall call " true neuritis " to be dealt with. They form a very large percentage of neuritis cases, which are all, fortunately, curable. This statement may appear to verge on the extravagant, but it is based on an experience extending over a period of sixteen years and a long series of cases.

In true neuritis, simple or multiple, the pain is due to hyperæmia, exudations or adhesions—generally to all three—affecting a nerve and its sheath ; and, as a rule, the morbid area or areas are limited in extent, and can be traced to a spot or spots usually no larger than a split pea, and sometimes even smaller. These morbid spots may be widely separated, or may lie comparatively near to each other, but whatever the distances of separation, there is always a space between them free from trouble. Each area is an independent, exciting cause of pain. Consequently it follows that every diseased spot in an affected nerve must be localised and treated directly before neuritis can be got rid of. If one spot of trouble is overlooked the pain remains in that spot, and may radiate over a wider field (sympathetic or reflected pain), even extending to and covering the areas previously treated, and giving rise to a feeling on the part of the patient that no good has been done, although perhaps nine-tenths of the mischief have been got rid of.

In some of the most severe cases agonising pain may

arise from one diseased spot, radiating over a network of nerves, and when this spot has been treated the pain permanently disappears, often within an hour or two of treatment.

It seems to me that the term "simple neuritis" should be used to describe neuritis due to one diseased spot, and "multiple neuritis" to describe neuritis due to more than one diseased spot, whether these spots are in one nerve or several.

Uniformly satisfactory treatment can only be assured by strict observance of the *technique*, which I shall now describe.

Testing for Neuritis.—Attach a small conical electrode to the negative pole of a Faradic battery, and an ordinary disc electrode (or chain electrode) about two inches in diameter to the positive pole. Soak the electrodes in warm saline solution, and apply the positive to the skin at a spot remote from the seat of pain. The negative is then applied to an indifferent point, and the current turned on until the patient feels it distinctly.

The current should be just strong enough to excite pain in a diseased nerve-spot, but not to cause pain in a healthy nerve. It is most important to observe this point carefully, otherwise the test will be misleading.

The negative electrode is now moved over the skin slowly towards the suspected field of mischief. Directly a "spot" is touched the patient is conscious of an intensified sensation, and may wince more or less, according to the acuteness of the underlying mischief and the strength of the current. It is well to approach this responsive spot from different points, as travellers converge upon cross-roads from various directions, and if the finger-post of pain always indicates the same spot, the conclusion is obvious. In this way the whole nerve-field in the neighbourhood of the mischief is explored,

and the worst of the painful spots marked for treatment. A little experience enables one to feel sure of the actual state of things, and to distinguish between the reaction at the seat of mischief and the mild sensation provoked over a sympathetic area. If the patient is of the hysterical type, the testing must be carried out with extra care.

A local anæsthetic is next injected, thoroughly infiltrating the nerve and neighbouring tissues. When prolonged anæsthesia is desirable in specially nervous or worn-out patients, hydro-chloride of urea and quinine is most useful.

Personally I make it a rule to administer by the mouth $\frac{1}{150}$ grain of trinitrine, $\frac{1}{100}$ grain digitaline, and a teaspoonful of aromatic spirit in water before giving the hypodermic, to obviate the unpleasant after-effects of cocaine, and it answers its purpose admirably.

When anæsthesia is complete, the disc or chain electrode already described is attached to the positive pole of a *galvanic battery*, and placed on an indifferent part some inches —not less than three or four—away from the spot to be treated. An insulated needle, with a platinum spear-point, exposed for one-third to one-eighth [1] of an inch, carried in a suitable handle, is attached to the negative pole, and held against the spot marked. The current is turned on very gradually, increased slowly up to, but *never more*, than 6 m.a., and the needle-point is pressed gently through the skin towards the underlying nerve.

Some patients are very sensitive, in spite of the anæsthetic, and cannot bear the full dose (6 m.a.), but in these cases the lesser dose is sufficient to bring about the desired result. The current is to be continued for *ten minutes*, and turned off very slowly, for sudden stoppage causes pain.

[1] Needles for nerves near the surface should have a short "spear," to avoid damaging the skin.

The needle should be pushed through the skin beyond the spear-head as quickly as possible, for the skin sometimes retains a little sensitiveness, and it is well to guard against electrolytic action upon the skin, by bringing it into contact with the insulated portion of the needle. In this way you avoid making unnecessarily large punctures. Once through the skin, the needle is worked towards the affected spot in the nerve, its approach being signalled by slight twitchings of the muscles and increased sensation, the patient often remarking: "That is the exact spot. It is like the old pain." When you succeed in causing the old pain during the treatment, you may be sure that your *technique* is right.

The rule is: Where sensation is most acute there the treatment must be concentrated, directing the current upon it from the point of the needle, allowing the latter to touch or hover about the nerve, but not to pass through it. Here experience along can guide you, aided by close observation of muscular reactions and the patient's signals.

The punctures left by the needles should be painted over with a layer or two of "new skin" or liquid court plaster.

Needles of various lengths are required—from one to five inches—according to the depth of the nerve to be treated beneath the surface.

I have never known any ill-effects following treatment. It must not, however, be forgotten that atrophy of a nerve and more or less paralysis are often the sequelæ of neuritis. They should be noted *before treatment*, and pointed out to the patient, otherwise the mischief may be attributed to the wrong cause.

To explain the beneficial results of this treatment, it is only necessary to point out the effect of electrolytic action upon hyperæmia, exudations and adhesions, and the effect of adjusted doses of current upon excited nerve-centres and inert physiological conditions.

The question has often been put to me : " Why does this treatment succeed in cases where excision has failed ? " The answer is simple. The diseased spot in neuritis is very small, and, in the absence of testing and isolation, is often missed, and a healthy portion of the nerve excised. Testing directs the needle unerringly to the spot, and the good result follows.

It may be interesting to refer to a few cases treated by this method :—

Mrs. D., aged 50, severe neuritis of the fifth nerve, of two years' duration, during the whole of which time she had been under treatment. In London she had ethereal and other injections, and the varied treatment usual in such cases, but without any good result. All her teeth had been extracted. As her general health was rapidly failing, under the stress of pain and insomnia, she was advised to have her Gasserian ganglion excised. In this condition she presented herself to me for treatment.

After cocainising, a needle was passed through the mental foramen into the inferior dental canal, the positive disc applied to the temple, and the procedure already described followed out. After an interval of a day the auriculo-temporal nerve was treated in the same way, and then, another day intervening, the frontal, the facial and a communicating branch of the temporal. The patient was now able to rest at night, and take more food, but felt occasional sharp paroxysms of pain in the lower jaw. A sensitive spot was found on the edge of the gums. This was treated with a cutting cautery, the gums being slit down to the bone for an inch or so. The last remnant of pain disappeared, sleep returned, the general health rapidly improved, and there has been no relapse. It ought to be mentioned that there was a little catarrh of the middle ear in this case, and that some neboline, No. 8, was injected into the chamber through the Eustachian.

This case is important, as it shows that the disease had not invaded the Gasserian ganglion, and that the removal of the ganglion was unnecessary. Indeed, it would have resembled the uprooting of a tree for canker in some of its branches when pruning would have done. I was not hopeful of good results in this case, owing to the difficulty of getting

at the nerve in the dental canal and to adverse anatomical conditions. To take a simpler case :—

Neuritis of an intercostal nerve, in a well-built, athletic man of 48, who had been treated in South Africa and afterwards in London, without benefit. Testing revealed one spot of trouble only, which was immediately treated. In less than an hour the pain, which had been intense and constant, had quite gone. In three days the patient was playing golf.

Another case :—

A builder of 35, whose case had been diagnosed in London as "disease of the membranes of the brain," came to Llandrindod Wells, as he thought and was told, to end his days drinking the waters! It turned out to be neuritis of the extracranial nerves. Seven spots were localised, and treated on alternate days. The pain cleared up in three weeks, and the patient has had no relapse since the treatment, four years ago.

One more case :—

That of a man of middle age, suffering intense pain in the head, the paroxysms being so severe that he had to be prevented by force from running his head against the walls of his room. He had had portions of his nerve excised, and two years' treatment in hospitals and out, without obtaining even temporary relief. Seven painful spots were found in his scalp, which were treated on alternate days in the usual way. He got quite well in a few weeks, and returned to his work. That was nine years ago, and there has been no relapse.

Enough has been said to indicate the value of this treatment in varied forms of neuritis.

In neuritis of the extremities the procedure is comparatively simple, and the results are invariably good.

It would be rash to assume that every case of neuritis of the "fifth" can be cured by this or any other method. The anatomical conditions are so obstructive that one can conceive cases in which the "spots" are so placed as to defy access. At the same time, I have not so far met with any of these intractable cases.

To summarise: Every painful spot in a nerve or nerves must be accurately localised, marked, and anæsthetised. The needle must be long enough to reach the affected nerve, and

be inserted into the exact spot, otherwise the result will be disappointing. The current must be slowly turned on and off, and never allowed to continue for more than ten minutes, at a maximum dosage of 6 m.a. The needle puncture must be covered with aseptic varnish. Severe cases may be treated daily, subacute or chronic cases on alternate days. The patient should rest for a few hours after treatment.

In acute sciatica rest and treatment should go on hand-in-hand for a few days, until the worst of the pain has been subdued, and then quiet and increasing exercise should be advised, followed by the Scotch douche.

There are, of course, the questions of exciting causes and general treatment to be considered, but these lie outside the scope of this article.

A word of caution as to the risk of ordering prolonged rest in neuritis of a limb, which often leads to contraction of a joint and permanent stiffness. This is a serious matter, and as the pain for which rest is prescribed can be quickly got rid of by other means, there seems to be no justification for the "rest cure." Massage too does much harm in acute neuritis, and should only be resorted to to restore wasted muscles or stiff joints, after the pain has ceased.

NOTE.—Portions of this article appeared in *The Practitioner*, June, 1914 ("Neuritis: Treatment by Electricity)."

WOMEN DOCTORS WITH THE ARMY IN THE FIELD.

BY

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AMONGST the unusual features of the present war may perhaps be reckoned the part played by medical women in attending the wounded, and a short account of their work

may prove interesting. True, the number of hospital units which they have run wholly or in part is still under twenty, and the number of women doctors concerned is probably still under fifty, yet when one considers that there are only about a thousand on the register, this is a very fair proportion.

A move was first made in this direction by Mrs. St. Clair Stobart, who during the Balkan War organised at Kirk Kilisse a hospital run entirely by women. Despite a seven days' trek in bullock wagons, the staff arrived in fit enough condition to cope with seven hundred patients in six weeks, and after the cessation of the main war the three doctors concerned stayed on as army medical officers under the Bulgarian Government.

At the beginning of the present campaign appeals were immediately made to Mrs. Stobart to organise work of a similar nature, and the Belgian authorities received with gratitude her offer to establish a unit in Brussels. University buildings were allotted as a locale, and a staff including women surgeons from London and provincial hospitals, was got together, but unfortunately Brussels was occupied by the Germans before work could be begun. After one or two threats to shoot her, Mrs. Stobart was allowed to return to England, and a second attempt to start a hospital in Antwerp under the auspices of the St. John Ambulance Association proved more successful. Here a large concert hall, situated in beautiful gardens, and accommodating one hundred and thirty patients, was provided by the Belgium Red Cross, and a party of medical women, including an X-ray expert, twelve nurses and twelve women orderlies, went out. The British Minister and the medical and military authorities all spoke equally favourably of the work done, and it must be admitted that it was accomplished under some difficulties, as after 8 p.m. only night lights and electric torches were allowed, and the wounded came in from

the battlefield invariably after midnight. The theatre was the only place where black curtains permitted the use of electric light.

Before three weeks had elapsed, however, the bombardment began, and as the shells were falling all round the building, the one hundred and thirty patients had to be moved. The majority were transferred to some very inadequate cellars, and within twenty-five minutes from the beginning of operations the whole hospital (which contained thirty absolutely helpless cases) was emptied. After about twelve hours it became evident that it was impossible to continue in the cellars, both on account of their insufficient accommodation and the probable entry of the Germans, so such patients as could not stand a long journey were removed to a more commodious hospital in the city. Some who could walk betook themselves to a place of safety, and the remainder were dispatched to Ostend and England.

Belgium being now for the moment out of the question, an approach was made to the French Red Cross, who offered as a hospital the Château de Tourlaville near Cherbourg. On this occasion the unit went out with numbered Red Cross War Office brassards, under the combined auspices of the St. John Ambulance Association and the British Red Cross Society, the latter presenting the unit with an ambulance and a driver. On this occasion, too, the party took five other cars, two of them driven by women, and Dr. Florence Stoney was appointed Medical Controller. The Tourlaville offer was scarcely complied with, when a request came from the Belgian authorities to again undertake work for their wounded. It was, however, impossible to divide immediately into two, as the château accommodated some eighty patients, and the cases were very heavy. There were, however, a few Belgian wounded amongst the French, just as at Antwerp there were a few English among the Belgians. Comparing

the work with Antwerp, the cases were not of course acute abdominals and chests so far from the firing-line, but owing to the closer range of the firing the wounds were far larger and more lacerated, and sepsis was extreme.

This hospital has now been running four months, and as the wounded are not now coming into Cherbourg in such great numbers, Mrs. Stobart is organising another medical women's unit for Serbia, taking with her some of the old staff. As in Antwerp, the military authorities concerned, this time Dr. Chaput from the French War Office, expressed the highest approval of the Cherbourg unit, stating in writing that the surgeons were "de meilleur valeur." The reputation of the hospital amongst the laity and the wounded is equally high, some of the old patients wishing to return from the convalescent home if only to scrub floors, and the neighbours being much impressed with the home-likeness and family spirit of the institution.

Meantime shortly after the war began Miss Garrett Anderson organised a medical women's hospital under the French Red Cross in Paris. Its locale was Claridge's Hotel, and the unit contained members of the surgical staffs of London hospitals. A great number of English officers and men as well as French occupied the one hundred and fifty beds, while the standard of the medical work can be gauged by the fact that the hospital was almost immediately recognised by the English authorities, and that subsequently Miss Garrett Anderson inaugurated a second hospital at Wimereux for seventy English soldiers directly under our War Office. The lay point of view may be gathered from the remark made by a Scotch patient, when asked if there were no men doctors, "What for would we be wanting them?" A correspondent too, writing in the *British Medical Journal* last autumn, remarked that if British medicine were represented abroad by this one institution

only, it would still be well represented ; while some humour in the situation appears when one reflects that Sir Frederick Treves announced to two women doctors last November that no English soldiers were put under the care of medical women.

Inasmuch as no prophet is without honour in his own country, the direct recognition of the Wimereux hospital by the English War Office is the greatest indication of the utility of women in war time. Kingsley's " men must work and women must weep " has long been somewhat out of date in times of peace, but many have held that as far as war went that delimitation of function still remained, at any rate for the actual area of operations. Even there, however, work of first-class importance has been found for women.

At the same time as these hospitals were at work the Scotch Federation of Woman Suffrage Societies was collecting £12,000 to equip three medical women's units for France, Belgium and Serbia respectively. The first, at Abbaye de Royaument, under Dr. Tiens, M.S., of Liverpool, has five or six doctors on the staff, amongst them an X-ray expert. It is about forty miles from the front, has now seventy patients, and is possessed of three cars, by means of which it can collect the most seriously wounded from near the field of battle. The same appreciation—medical, military and lay—has been expressed for their work as for that of the other women's hospitals.

The Belgian unit consists of three doctors and ten nurses, who have taken over the fever annexe (fifty beds) in the hospital of the Belgian Dr. Dépage in Calais. It also runs a car, and the British Red Cross gave £2,000 to the hospital. Apparently no sooner did the Belgians find Mrs. Stobart's unit unable to help than they turned to the Scotch Federation to supply medical women.

The third (Serbian) unit also consists of about six doctors, twelve nurses and twelve women orderlies. On its arrival at Kraguievatz it was presented with a hospital of two hundred and fifty wounded. It is too early yet for details of work, but more doctors, ten more nurses, and £500 more of medical stores have already been asked for and are going out.

Next, to turn to those hospitals at the front officered by men and women together.

The first of these was the British Field Hospital for Belgium (one hundred and fifty beds), which accomplished some weeks' admirable work in Antwerp before the bombardment compelled its evacuation. This hospital was remarkable for what was done in surrounding districts often under fire. For instance, on one occasion at Malines one of the women was working for seven hours with shells falling round on the roof and in the courtyard of the hospital, which was only hurriedly emptied as the Germans were entering the town.

Mention must also be made of the numerous women (medical, nursing and lay) who went out every evening in their ambulance cars to pick up the wounded. In particular a word here should be said concerning Mme. O'Gorman, who, driving her own car, brought in one hundred and twenty wounded in this way, and who escaped all dangers of shot and shell, only to succumb a month later to an illness contracted from patients in mid-France.

Other hospitals in Calais, Dunkirk, Limoges, Mentone, and several other towns in France and Serbia, have also women on their staffs, and in some cases they are in charge. As regards military hospitals at home, the Southall and Ealing Hospital has two women on its staff, and another Government hospital for infectious cases has a woman as joint pathologist. Moreover, Miss Barrie Lambert, M.D., physician in charge of the mechano-therapeutic department

of the Middlesex Hospital, started with Miss French the Almeric Paget massage corps, which has supplied 115 hospitals and treated 5,000 cases (*British Medical Journal*, 30th January, 1915).

So much for medical women. But a word must be said in conclusion of those other women at the front who are caring for the sick and wounded. Their name is legion, so a brief allusion can be made to those only whose work has involved them in danger. We find, for instance, in the *British Medical Journal* of 31st October, 1914, an account of seven women in one hospital who had been hit (one fatally) while attending to the wounded in neighbouring villages. *La Française* also gives an account of a number of women, many of them sisters of mercy, who carried on their work under shell fire, and as a consequence one sister was killed and one wounded. *Jus Suffragu* also in its roll of honour makes mention of three nurses killed and two wounded, one of whom was accorded the Legion of Honour, while another nurse died from infectious disease, and more recently yet another from infectious disease in Serbia.

Lady Dorothy Fielding, who was attached to Dr. Hector Munro's " flying ambulance corps " in Belgium, and who was often under shell fire, has also with another woman been accorded the Order of Leopold.

At home, moreover, in the east coast raid the nurses in hospitals, both in Hartlepool and Scarborough, were exposed to great danger, shells falling round and in the buildings.

It is with great thankfulness that women in general, and medical women in particular, find themselves able to be of real professional value in this great crisis of their country's history.

THE CLINICAL EXAMINATION OF STOOLS.[1]

BY

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REGARDED from a clinical standpoint, the examination of stools is a method of investigation that does not always receive the attention it deserves. A positive diagnosis of disease of the alimentary canal or its appendages, functional, catarrhal, or malignant, may be withheld solely from neglect of fæcal analysis. Moreover, although our knowledge of the ultimate effects of intestinal bacterial activity is not large, some striking illustrations of the possibilities of treatment as the result of this line of research have already been demonstrated.

I propose to describe a routine method of examination, drawing attention only to the more important tests at our disposal, and indicating briefly the significance of each step as it is taken. A specimen should be selected with some care, as free from contamination as possible, and it should for preference be collected in a clean, wide-mouthed, tightly-stoppered glass bottle with a capacity of from four to six ounces. The colour, reaction, smell and physical condition should be noted, and the presence or absence of any extraneous matter. The normal *colour* is due to stercobilin—a derivative of biliary pigment—and to the nature of the food. It is modified by certain drugs, by blood, by the state of the alimentary secretions and mucosa, the nature of the flora, the reaction, and the quantity of

[1] A paper read before the Bath Clinical Society.

moisture. Meat, red wine, and dark-red fruit berries make the colour darker, vegetable fibre paler, chlorophyl greener or more olive, milk diet white or pale orange. Chocolate, logwood, rhubarb, senna, santonin and gamboge have a tendency to turn it reddish brown, ferric iron very dark, ferrous dark only after exposure to the air, bismuth usually a slaty, sheeny grey-black. Blood if reduced and plentiful darkens the colour, and if excessive it gives it the appearance of tar. The bile pigments bilirubin and biliverdin if not reduced turn the motion green; this occurs in lienteric diarrhœa, as the result of the action of certain bacteria, from the action of calomel, and from the presence of bismuth in certain cases. A loose, watery stool is, *ceteris paribus*, paler than a hard, constipated one; an acid one may be pale from the presence of gas bubbles, demonstrable by the fact that it will float; alkalinity has a tendency to turn it reddish brown; fat, if largely unabsorbed, makes the stool pale and pasty; if bile is absent emulsification is retarded, hence the grey-white stool of jaundice; if the pancreatic juice fails, saponification is interfered with, and the stool is pale and yellow; if food is not absorbed from mucous catarrh, as in sprue, the colour is pale or orange-red.

Normally the *reaction* to litmus is amphoteric. Fermentation produces acidity, putrefaction alkalinity. The characteristic *odour* is due to indol, skatol, and perhaps also methyl mercaptan (Herter). It is more pronounced with a meat diet, still more so with putrefaction, in infants it is very faint or absent. A fermented stool has an acid smell due to the presence of volatile fatty acids (butyric, formic, etc). Mucus in large quantities gives it the odour of serum, dysentery that of lime. A cholera stool is odourless.

The further investigation with the naked eye should be directed to discovering the microscopic remains of food stuffs, of mucus, pus, concretions and intestinal parasites.

If the stools are fluid they should be carefully looked at before they are emptied out of the glass bottle, because frequently small opalescent masses of mucus can be seen lying at the bottom on the surface of the glass. The most convenient method of search for heterogeneous particles is by transferring from one to three grams of fæces on to a glass plate, the under surface of which has been painted one-third black and one-third white. A little saline or water is then added, and the fæces are then rubbed down with a pestle or spatula. Fragments of meat-fibre, starch, cellulose, fat, connective tissue, mucus, pus, "sand" or other suspicious particles should if present be picked out for microscopical examination. "Sand," if found, may be collected by shaking up the final remainder of the stool in the glass bottle with repeated washings of water, and gathering it from the surface or from the bottom of the vessel, according as it sinks or floats.

A microscopical examination is in many respects of greater importance than that of the naked eye. For since masses of food which have been imperfectly masticated and bolted may escape the action of the alimentary enzymes, the presence of excessive amounts of unaltered food in the homogeneous parts of the stool may offer direct evidence of their absence. In proceeding, a platinum loopful of a homogeneous portion should be put on to a glass slide and a cover glass well pressed down so as to make a thin, transparent smear. Examination will reveal a considerable quantity of pale, amorphous detritus. Search should be made for food remains, mucus, inorganic granules, crystals, etc.

Muscle Fibres can be easily recognised by their fine cross striations. They may be present as small, detached square or oblong fragments, or in masses clustered together or ranged in parallel. Their presence in any but minute quantities denotes one of the three following conditions :—

1. Rapidity of the passage of food through the intestinal

tract, such as occurs in diarrhœa or after the administration of a purgative.

2. Deficiency of hydrochloric acid in the gastric juice. The connective tissue surrounding the fibres remains unacted upon, and hence the proteolytic enzymes are unable to penetrate to the muscle fibres. In such cases careful naked-eye examination should be made on the plate for connective tissue, which, over the dark ground, is seen to have a fibrous structure, which clears up on the addition of acetic acid. It may be distinguished from mucus by its firmer structure.

3. Deficiency or absence in the alimentary canal of the pancreatic juice. In such cases the nuclei may be well preserved, and should be stained with millon followed by the application of heat or with methylene blue.

VEGETABLE REMAINS.—*Cellulose* in the form of spirals or cellular shells are quite common, so also are small vegetable hairs formed of a homogeneous material with a well-marked central canal. If *starch* is suspected Lugol's solution should be run under the slide, or another preparation mixed with the solution should be prepared. Clear differentiation must be made from starch granules and small particles of black due to charcoal, iron or bismuth which may be present, and which should have been previously observed. The presence of starch in any quantity is one of the indications of pancreatitis, and it is also present in the stools of certain children who do not thrive as a result of pancreatic deficiency, a fact that can be rectified by treatment with diastase or malt.

FAT in some form or other is invariably present in the stools. Occasionally there may be large fat concretions, and both in diarrhœa and in pancreatitis small masses that can be detected by the naked eye are by no means rare. In

certain conditions to be considered later the stools may be pasty and obviously fatty.

Microscopically in the normal stool small glistening beads of neutral fat may be usually made out. In order to identify them half a gram of fæces should be put into a test tube, a drop of acetic acid added if the stools are alkaline or neutral, and one c.c. of a saturated solution of *Sudan* iii. in 70 per cent. alcohol poured in and the mixture well shaken up and allowed to stand for some hours. When examined, the fat globules will be recognised by their bright pink appearance, while fatty acids will be yellow, and soaps a pinkish yellow. Fatty acids can, however, be easily seen in a fresh smear by the peculiar shape of their needles, and masses of these crystals can be seen clustered together in cases of pancreatitis and in sprue.

The normal quantity of fat in a healthy stool is from 25 to 33 per cent. of the dried solid constituents. The proportion of neutral fat and free fatty acid on the one hand and combined fatty acids or soaps on the other is roughly half and half. In certain diseases of the liver, pancreas and alimentary canal both the total quantity may be considerably increased and the proportions altered, and if this should be the case it is of the utmost importance that a quantitative and proportional estimate should be made.

For this purpose from 20 to 30 grams of the fæces are dried in a porcelain dish on a water bath in a fume cupboard until absolutely dry. The dish is then transferred to a desiccator, and the dried fæces are then ground to a fine powder in a mortar.

Two 50 c.c. measured glass tubes are then taken, and an accurately-weighed half gram of the powder is placed in each tube. Into one of them 10 c.c. of 33 per cent. HCl is then poured, and the mixture heated on a water bath for half an hour. All the combined fatty acids, or in

other words the soaps, are by this method converted into free fatty acids. The mixture is then cooled and methyl ether is run in up to the 50 c.c. mark.

Into the other tube 10 c.c. of distilled water is run, and then ether to the 50 c.c. mark. The ether in this case only takes up the fat and free fatty acids, whereas in the first tube all the fatty acid radical present is dissolved. Twenty c.c. of the ether extract is pipetted off into a weighed glass beaker, and the ether evaporated off and the beaker weighed again.[1] This is done in each case. In working out the quantities an allowance of 2 c.c. of ether dissolved in the 10 c.c. of HCl or water must be made, *i.e.* the total ether added must be reckoned as 38 per cent. and not 40.

CRYSTALS of the alkaline earths are commonly seen under the microscope. Calcium and ammonio-magnesium or triple phosphates are the more usual. Calcium oxalate is found especially after large vegetable diet, such as spinach, etc.

INTESTINAL "SAND" is fairly frequent in mucous colitis, and varies in colour from a brick red to a dirty white. The particles are composed chiefly of calcium phosphate, with traces of calcium oxalate, salts of magnesium, iron silicates, and organic matter, etc., coloured with stercobilin. "Sand" also exists in the form of calcium soap, and both these forms have to be differentiated from "vegetable sand," which usually floats, and which has no pathological significance. It may consist of the seeds of fruits or other small masses of wooden fibre.

INTESTINAL CONCRETIONS are not often found, but should be searched for. Biliary concretions disintegrate easily. They are usually laminated, and are formed mainly of cholesterin and calcium-bilirubin. Pancreatic concretions (calcium carbonate) are rare. Concretions may also be formed from substances taken by the mouth, *e.g.* magnesium

[1] The beaker in each case having been carefully dried in the dessicator.

carbonate and phosphates, bismuth, salol, shellac and occasionally fat, especially in oil cures.

INTESTINAL PARASITES should in all suspected cases be searched for. If not actually found the presence of their eggs would denote their existence. Eighty-one species are known to infect man.

ENDOMYCES have been obtained from the stools of normal individuals and those suffering from chronic intestinal diseases (sprue, etc.). Castellani has isolated no less than six varieties from stools and intestinal scrapings.

MUCUS may be secreted from any part of the small or large intestine. A coating of mucus to a well-formed stool denotes an origin in the rectum or pelvic colon, or, if mixed intimately, higher up in the large or small intestine. In the case of loose stools this generalisation fails, but it may be usually inferred that the smaller the particles of mucus the higher is their origin. Macroscopically mucus may resemble small particles of fat or hyaline vegetable matter. Macroscopically it has the appearance of long streaky granular semi-transparent beads. For confirmation a bead of mucus should be spread out on a slide, fixed and stained with methylene blue. If leucocytes are present in any numbers a catarrhal condition at its seat of formation may be surmised.

PUS, if present in considerable quantities, points to some perforating abscess. If the cells are only to be found in small amount and by the aid of the microscope, the probability is that there is some ulceration ; but the absence of pus cells does not preclude an ulcer, because the cells are apt to decompose and fragment.

OCCULT BLOOD.—If malignancy is suspected the stools should be searched for small masses of growth, which if found should be fixed and stained. Such findings are,

however, rare, and by far the most important procedure is the test for occult blood.

The guaiacum test should first be applied, and if this is positive the benzidene (Schlesinger and Holst's method).

If the latter is negative no occult blood is present, though it is just as well to do a control.

A diet of under 40 grams of meat is not sufficient to give the benzidene reaction, but a special meat free diet for three previous days is to be preferred. The benzidene perborate method (Colwell and MacCormac) will give a positive reaction with the minutest traces of blood (one part in a million), and which will not react to any enzyme or to iodide of potash, and which will, moreover, react even if inhibitory substances are present. In any doubtful case this test should certainly be performed.

In suspected gastric or duodenal ulceration the test should be undertaken (if negative) on several different occasions.

Guaiacum Test.—Extract with glacial acetic acid. Add equal parts of ether. Take some of the ether solution floating on the top and mix with equal parts of water. Add a few drops of tincture guaiacum and then ozonic ether. Positive test, possibly blood, but may be due to pus, saliva or organic matter.

Benzidene Test.—Take a piece of fæces the size of a walnut. Add two or three times the quantity of water. Boil and cool. Filter if necessary, and add to benzidene solution. Benzidene solution. Add a knife point of benzidene (Merck) to 2 or 3 c.c. of glacial acetic acid. Add 5 to 10 drops to 3 c.c. of 3 per cent. solution of H_2O_2 so as to make mixture opalescent.

Benzidene Perborate Test.—Mix 0.1 gram of benzidene, 0.1 of sodium perborate in 10 c.c. of glacial acetic acid. Take 5 c.c. of liquid fæces (or half gram of solid) and add

5 c.c. of glacial acetic acid. Shake or mix well, and add 10 c.c. of ether. Pipette off 5 c.c. of ethereal extract into a white evaporating dish, and evaporate off ether. Add 1 c.c. of benzidene perborate solution, and another 1 c.c. if necessary. Positive reaction, intense blue.

STERCOBILIN.—A considerable amount of help in hepatic and intestinal disorders can very often be obtained by the test for stercobilin. The bilirubin and biliverdin of the bile gradually become reduced to stercobilin (intestinal urobilin) by the aid of bacteria. If a small portion is mixed in a test tube with three or four times the quantity of a saturated solution of perchloride of mercury a pink reaction, due to the formation of its mercuric compound, should result in about twenty minutes in normal stools. In diminished or total absence of bile this reaction is delayed or absent.

In the so-called saccharo-butyric form of intestinal fermentation the reaction is very marked. In diarrhœa, on the other hand, the pigments may be passed unchanged, and the reaction is green owing to the formation of mercuric hydro-bilirubin and biliverdin.

The value of the stercobilin fat and guaiac tests in certain instances of hepatic and pancreatic mischief, together with the microscopical findings, will be made clearer by the following table.

A great deal of work has been done in recent years on the bacterial flora of the intestine, and though much of it has so far proved fruitless, a considerable amount of knowledge of value has accrued from it.

Roughly speaking, about one-third of the solids of the stools consists of living and dead bacteria. The quantity is greater in diarrhœa and less in constipation. The number that can be cultivated is about 1 per cent., but this is not equivalent to the percentage of living bacteria, which is probably somewhat larger. The difficulty is that many of

	Colour.	Reaction.	Odour.	Muscle Fibre.	Starch	Total Fats. %	Fats. Saponified. %	Fats. Unsaponified. %	Emulsion.	Saponification.	Stercobilin.	Urinary Urobilin.	Blood.
Obstruction of the bile duct.	White.	Acid, sometimes alk.	Putrid and sour.	O	O	60	20	40	– d	N	O	+	O[2] / +
Obstruction of pancreatic duct.	Pale Yellow.	Alk. sometimes acid.	Putrid.	+	+	60	4–10	50–56	N	O	N	O	O
Obstruction of both ducts. Ampulla of Vater	White.	—	Putrid.	+	+	60	4–10	50–56	O	O	O	+	O[3] / +[4]
Primary Pancreatic Achylia.	Pale.	—	—	O	O	40	5	35	N	O	N	O	O
Sprue[1]	Orange to Red.	Acid.	Faint acid.	+	+ O	34–57	29–32	5–28	N	N	N	O	O
Normal	Dark Brown.	Amph.	Faecal	O	O	25–30	12–15	12–15	N	N	N	O	O

[1] P. S. Cammidge. [2] Secondary cholangitis. [3] Stone—no wasting. Carcinoma—wasting and cachexia.
[4] Malignant ulcer. Tissue wasting. Duodenal ulcer. N=normal; O=absent; +=excess.

The figures in the above table are approximate only.

In primary pancreatic achylia there may be the absence of one or more of the proteolytic or amylolytic ferments and of lipase. The absence of the latter alone is the type given in the figure.

the anaërobic organisms do not survive attempts at cultivation.

Though the number of varieties is large, certain types are found to predominate. By making a thin transparent film as detailed above, and staining this with gram and counterstaining with a weak acid fuchsin solution, a very fair estimate of their nature and proportions can be made. In order to obtain uniform results the gram stain should be applied for four minutes, the iodine for half a minute, and the alcohol for one minute: if this is not done confusion may result.

In an ordinary healthy adult on a mixed diet the ratio of gram +ve and gram —ve organisms is about equal. The preponderating gram +ve bacteria are the *B. bifidus* and *B. acidiphilus*, which both attack carbohydrate food or their cleavage products, and the large and small subtiloid bacilli, which attack proteids and their products. The chief gram —ve organisms are the *B. coli* group with the *B. lactis aërogenes*, the *B. coli* having the largest representation of any form.

Besides these there are many others, bacilli and cocci and spores. The *streptococcus fæcalis*, described by Andrews, is almost always present.

Most of the bacteria referred to above are in the proportions present perfectly harmless. There is an acquired and an hereditary immunity, and the liver has probably large detoxicating powers. They are even beneficial, for they inhibit the growth of pathogenic forms. Under certain circumstances, however, as in stasis following obstruction, the *B. coli*, for instance, may get out of hand, and along with the others become extremely toxic through their products.

It is not, however, only in acute disease that they may prove harmful to these parts, for carbohydrate and protein cleavage may through their influence or through that of extraneous organisms become a cause of chronic mischief.

Herter, whose work in this respect is second to none, differentiates three main types of ultra or vicious cleavage, and his method of classification has now been adopted by all workers on the subject.

THE INDOLIC TYPE.—This is characterised by excessive proteolytic decomposition caused by members of the *B. coli* group and probably *B. putrificus*. In the gram-stained field the gram —ve bacteria predominate. The urine gives a strong indican reaction.

The ratio of $\frac{\textit{ethereal sulphates}}{\textit{inorganic sulphates}}$ in the urine, instead of the normal $\frac{1}{10}$ becomes $\frac{1}{5}$ or $\frac{1}{4}$, and occasionally the indol acetic reaction is strongly +ve (red colourisation of urine on addition of HCl, and if necessary a few drops of 2 per cent. sodium nitrite).

THE SACCHARO-BUTYRIC form of fermentation is due to the presence and action of a very large number of anaërobic butyric acid producing bacteria in the lower ileum and the colon. The chief organism concerned is the *B. aërogenes capsulatus* (gram +ve). Hence a gram field in which the gram +ve predominate. The stercobilin reaction is very marked.

THE COMBINED INDOLIC AND SACCHARO BUTYRIC TYPE.—This form leads to rapid fall in health accompanied by neurasthenia. Herter and Kendal have shown how it is possible to modify the flora by alteration in the diet. On a protein diet the coli group (gram —ve) were shown to be markedly predominant, and both large and small subtiloid gram +ve bacteria were present in fair numbers. The ratio gram +ve and gram —ve was about even.

But on a carbohydrate diet gram +ve organisms became markedly predominant, the *B. coli* (—ve) diminishing very

greatly and the *B. acidiphilus* (—ve) and *B. bifidus* (+ve)[1] becoming prominent. The significant fact was that this occurred irrespective of the normal feeding habits of the animal, for it was manifested equally in carnivorous and herbivorous animals. Treatment based on these researches offers a very fair field for advance, and some promising results have already been published of the treatment of cases of rheumatoid arthritis, colitis and pernicious anæmia by starving the offending organism. But much more work on the subject is required, and it is to be hoped that by adopting these lines our knowledge and treatment of many chronic diseases may be furthered

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[1] A slight indol acetic reaction was found to be rarely absent in seven or eight hundred investigations of the urine of patients suffering from chronic disease at the Royal Mineral Water Hospital, but it is not often very marked.

It is sometimes intense in acute disease, appearing and disappearing very suddenly. In a case of pneumonia it suddenly appeared on the day after the crisis, and disappeared completely in five days.

Progress of the Medical Sciences.

MEDICINE.

Further notes on the tuberculosis campaign.[1]—The effects of the war are greatly retarding the work of the tuberculosis campaign : all literary work is carried on at great disadvantage. Many journals have ceased to appear, others are issued at irregular periods, and even the *Tuberculosis Year Book and Sanatoria Annual* (vol. ii.) is of necessity postponed, as it is impossible to get the necessary particulars regarding various schemes, many of the health and tuberculosis officers being away on active service. *The British Journal of Tuberculosis* (October, 1914, vol. viii. No. 4, p. 237) emphasises this fact as follows :—

"Whilst no sympathy and no support will be denied to those who wage war for the protection of the Empire and the maintenance of world-wide liberty, it is essential that the medico-sociological needs of the nation should not be neglected. . . . Judging from experience in other times of national distress, it is safe to prophesy that there will be a considerable increase in the number of necessitous tuberculous cases at all ages. Among our soldiers and sailors it is probable that the heavy strain, long exposure, and physical ills to which they must be subjected will kindle slumbering foci of tuberculosis. . . ."

For the sake of the civilian population it is essential that the tuberculosis campaign should be maintained in full fighting force. No plans and schemes should be suspended, and the Local Government Board should be encouraged in every way to carry on the work they have initiated, and to which they are pledged.

During recent years there has been a conspicuous fall in the mortality from tuberculosis, and it will be of importance to prevent, in so far as is possible, any rise during this time of trial. Moreover, it is pointed out by Dr. Kelynack (C.O.S. Report, 1915) that we must not overlook the influence of the presence of some 250,000 Belgian refugees amongst us, many of whom are known to be tuberculous.

Dr. Kelynack has been very energetic in doing his level best to keep the flag flying, and in spite of many obstacles has been able to prepare the first volume of the *Year Book of Open-Air Schools and Children's Sanatoria*, a companion volume to the *Tuberculosis Year Book and Sanatoria Annual.*[2] This volume

[1] *Vide* vol. xxxii. p. 63, also p. 179.

[2] John Bale, Sons & Danielsson, London. 1915.

should be of much assistance to officers of health, and to many public authorities, and to all who are engaged in anti-tuberculosis efforts. The open-air sanatorium and school stand as embodiments of new principles in preventive medicine, and have already abundantly justified their existence. For delicate children the open-air education and treatment are accomplishing splendid service, and the various reports have shown how much more common is tuberculosis in infancy and childhood than was formerly supposed, so that questions relating to tuberculosis in early life must not be allowed to slide. The chief medical officer of the Board of Education in his reports for 1911 and 1912 gives information on the question of grants in aid. It has been arranged that a sum of £100,000 shall be ear-marked for grants towards the cost of providing sanatorium schools in England for children suffering from pulmonary or surgical tuberculosis, and further maintenance grants may be paid in respect of children attending sanatorium schools. At present the number of effectively equipped sanatoria for children is woefully inadequate. Various schemes are discussed, and it is hoped (to quote Dr. Walford, of Cardiff) "that those bodies who are directly responsible for the provision of institutional treatment will fully realise the importance of securing an efficient administrative co-ordination between the school clinic, dispensary, laboratory, open-air school, sanatorium and hospital.

The nature and aims of the open-air schools are fully described in the *Year Book* (p. 6), and much information is given on the cases suitable for open-air education.

In this neighbourhood an open-air school, similar to those already existing in other towns, and carried out on lines laid down by the Board of Education, has been established, and we have before us the first Annual Report, 1913–14. The school is situated on the high ground at Knowle, on the south-east slope of a hill looking towards the Mendip Hills.

The report gives an account showing that the school has amply justified its existence. It has already done much towards restoring to health these ailing children who were first admitted, many have recovered sufficiently to return to ordinary schools, others are gaining strength daily, and during the first three months the average gain in weight at the fortnightly weighings was shown to be 1¼ lb. per child. The daily routine of the school is described in this report, 75 names are on the books, and 108 have passed through during the year. The average stay has been six and a half months.

The **duties of the tuberculosis officer,** as laid down by the Local Government Board, were indicated in our vol. xxxii, p. 64. Since that time Dr. Leonard Crossley[1] has indicated

[1] *Brit. J. of Tub.*, April, 1914, viii. 105.

how these dispensaries are working in the county of Wiltshire. He writes: "The duties centre round the dispensaries, the routine of which, as devised by Sir Robert W. Philip, is now well known. The aim of all this care is that no case of tuberculosis shall remain undetected and uncared for in the community, and that the right sort of treatment shall be provided for each case. . . ." "Being appointed by the County Council, and being on the staff of the County Medical Officer of Health, the County Tuberculosis Officer is brought into close relation with the general public health work of the county, and this is a great advantage. He has the help and advice of the County Medical Officer of Health, and the assistance of his clerical staff. He is informed of all cases of tuberculosis notified, and is able to report all cases of overcrowding and defective sanitation." The tuberculosis officer for Wiltshire writes that he considers that "the Insurance Act as regards tuberculosis is certainly a success. The class of patient who used to go to Winsley Sanatorium paying fifteen shillings a week has now ceased to exist, as if insured they are sent by the Insurance Committee, and if not insured by the County Councils or Boroughs free of cost. Patients used to have to wait for months for the twelve subscribers' beds; now these are reduced to four, they are often not filled, and there is no waiting list. It is quite the exception for patients in Wiltshire to have to wait for three or four weeks. The dispensaries are in full working order and doing good. All tuberculosis patients are kept under observation continuously. After leaving the sanatorium they attend the dispensaries, their progress is watched, and so relapses are prevented. Then again many cases are being sent by their own doctors for aid in early diagnosis, so that they are discovered earlier than formerly. Patients are visited in their own homes by the tuberculosis officer, the dispensary nurses are available, and so their homes are supervised and improved, whilst other members of the family are examined. Shelters are also provided, and this often adds an extra bedroom to an overcrowded house." Until the hospitals for advanced cases are finished it is hard to avoid sending such cases to the sanatorium; such cases ought really to go to the hospital first, and if improving should then be transferred to the sanatorium. Such evidence as the above, from one of our most experienced sanatorium resident officers, is of much interest.

The Charity Organisation Society has warmly supported from the first the adoption of what is known as the dispensary system. Experience has shown that tuberculosis among working people has little chance of success unless it begins and ends with the home. Much information on this point is given by Dr.

Kelynack in his articles published in the *Annual Charities Register* of recent years.

From early days[1] the Charity Organisation Society has recognised how intimately the tuberculosis problem is associated with many branches of charitable work. Tuberculosis is not only a cause of long suffering and loss to the afflicted individual, but it oftentimes entails widespread poverty, deprivation and distress to dependents and associates. Tuberculosis is the cause of from one-fourth to one-third of all deaths among adults at the home-making and child-rearing period of maturity. In homes and orphanages for necessitous children something like 25 per cent. of the children have lost one or both parents from tuberculosis. It must also be remembered that tuberculosis is the most fruitful cause of such delicacy and crippling as commonly leads to dependency or entails assistance from charitable sources. The Charity Organisation Society has, therefore, been compelled to give special attention to the consideration of medico-sociological and economic aspects of tuberculosis. An account of the evolution of the work of the Charity Organisation Society in regard to the anti-tuberculosis movement is given in Mrs. Bosanquet's recent work.[2]

It is pointed out that the greatest single influence in the spread of the disease, namely, contagion through ignorance of the mode of spreading, having been practically eliminated, the subsequent progress towards the abolition of tuberculosis has become slower. It was in 1882 that Koch[3] discovered the bacillus of tubercle and definitely established the contagiousness of the disease.[4]

Dr. Thomas J. Mayo[5] points out that the effect of preventive measures began to be felt in 1899 or 1900. The earliest move of the kind was taken by New York in 1896, Boston in 1900, Philadelphia and Chicago in 1902.

Before 1900 the decline in the death-rate had been irregular, and not very persistently downward. Then it dropped rapidly, and it must be more than coincidence that this rapid drop corresponds so exactly with the period when the contagion was definitely established, and people began to use ordinary care in their daily contact with consumptives. Since 1895 the death-rate has still tended persistently downward, though at a slower pace. The diminution so far noted is chiefly amongst persons in the middle and upper walks of the social strata. It is the general experience that persons of normal intelligence and morals seldom succumb to the ravages of this disease, provided

[1] *Annual Charities Register and Digest.* Charity Organisation Society. 1914.

[2] Bosanquet, *Social Work in London, 1869 to 1912.* Murray. 1914.

[3] *Med. Rec.*, lxxxvii. 356. [4] Vide *Bristol M.-Chir. J.*, i. 1883.

[5] *Med. Rec.*, March 20th, 1915.

they are in a financially fit condition to carry out the necessary hygienic regime. The lower or submerged tenth has not been successfully reached. The further reduction of the death-rate is inseparable from the problem of poverty and defective hygiene.

Poverty and Tuberculosis.—A booklet published by the New York Association for Improving the Condition of the Poor (105 E. 22J Street, New York City, No. 84) giving the results of two years of the *Home Hospital Experiment* demonstrates three things :—

1. It is possible to treat families in which one or more members are afflicted with tuberculosis by keeping the family together in their own individual home without danger to other members of the family.

2. The results of training patients in their own homes under satisfactory conditions of living with adequate medical supervision compare favourably with results secured by removing the patient from his home and treating him in a sanatorium or other special institution for tuberculosis.

3. In the case of a family in which there are combined tuberculosis and poverty, care of the family as a unit by the Home Hospital method costs less than to break up the family, as is done under other methods of treating families with tuberculosis.

This record of the first experiment along such lines is of much interest and valuable for further efforts of the kind.

The great divergence of opinion as regards tuberculin treatment is still much in evidence. Majors Cochrane and Sprawson, [2] of the Indian Medical Service, have given a good account of their experience. They believe that "the ultimate aim of tuberculin treatment is to produce immunity to the infection by pure tuberculin, by the slow and steady advance of dosage, spread over a very long period. That this result may be achieved in the long run has been fairly well proved, and although by far the larger proportion of cases can only be said to be benefited, still there is reason to look forward to improvements, both in the theory and practice of inoculation, which may lead to a much greater percentage of success in time to come." [3]

Many forms of arthritis, including tuberculous affections, are benefited materially by heliotherapeutics, [4] and the method

[1] *Johns Hopkins Hosp. Bull.*, vol. xxvi., No. 290, p. 123.

[2] Cochrane and Sprawson. *A Guide to the use of Tuberculin*, 1915. London : John Bale, Sons & Danielsson. 5s. net.

[3] Reviewed in *B. M. J.*, 1915, vol. i. 1007.

[4] Jaubert, *La Pratique Héliothérapeutique*. Paris : Baillière et Fils, 1915.

seems to be particularly valuable for children and young subjects generally.

Few of those who advocate heliotherapy have been so enthusiastic and convinced as Rollier, of Leysin (vide *Year Book*, p. 114). He has long urged the value of sunlight in surgical tuberculosis, especially in selected altitudes, the influence being chiefly due to the ultra-violet rays which are the cause of skin pigmentation. The open-air school classes at Leysin under heliotherapeutic influences and continuous exposure to sun and air have a markedly beneficial effect on tuberculous abscesses and sinuses. Great importance is attached to the bronzing of the skin as an index of improvement, and it is said that no pigmented skin becomes the seat of acne in tuberculosis. It is obvious that good results cannot be expected from this method in this country and in winter.

Asphyxiating Gases.[1]—The composition of the asphyxiants used by the Germans in forcing back the French and English lines has led to much conjecture. It has been surmised that the gas used was carbon monoxide, but as this gas is slightly lighter than air, it would diffuse too rapidly to accomplish the object of the enemy. Later reports show that the gas is a true asphyxiant, such as sulphur dioxide, chlorine or a mixture of the two; these satisfy the requirements of being more than double the weight of air, and so would remain near the ground and only diffuse slowly. It has been said that bromine gas and formaline have also been used largely, but we must await the report of Dr. J. S. Haldane before we get any authoritative information on the subject. The efficacy and value of inhaled vapours are a much debated question when used for therapeutic purposes, but of the efficacy of the German gas to asphyxiate their enemy there has been more than ample proof. From further evidence we learn that there can be little doubt that chlorine or bromine was the chief agent employed, whilst shells containing other irritant poisons were also used.

"Both chlorine gas and bromine vapour, when present to the extent of 5 per cent. in air, rapidly cause death by suffocation by acting on the mucous linings of the nose, throat and lungs, so causing acute inflammation; but bromine poisoning is generally distinguishable by the skin of the victim being turned yellow, and the intense action on the eyes, which is much greater than with chlorine. The Germans have an unfailing source of bromine in the crude carnallite worked at Strassfurt for the production of potassium chloride, but it will probably be found that besides such obvious asphyxiants as chlorine, bromine and sulphur dioxide, they have also employed compounds of a more complex character."[2]

[1] *Nature*, April 29th, p. 234. [2] *Nature*, May 6th, 1915, xcv. 267.

The Germans have apparently contrived to dispatch the gas by means of shells, and one officer's experience was that in the bursting of the shells a green gas was developed, and before he and his comrades had a chance of moving they were inhaling the poisonous gas, and a moment later were struggling terribly for breath. . . . He had no doubt that the gas in the shells and the curtain of "creeping gas" were of the same nature.[1]

Reviews of Books.

A Text-Book of Medical Jurisprudence and Toxicology. By JOHN GLAISTER, M.D., D.P.H. Camb., F.R.C.S. Pp. xv. 857. Third Edition. Edinburgh: E. & S. Livingstone. Price 15s. net.

A valuable work by an authority on the subject, and, as a book of reference, one which will be of great use to lawyers and medical men. It is comprehensive in its scope, and includes much information with regard to the legal position of the medical practitioner in his relationship with the General Medical Council, the Coroner and the Magistrate.

In discussing the question of conflicting medical evidence the author, referring chiefly to civil actions, very wisely remarks, "While it might be Utopian to expect that medical witnesses for both sides should confer together regarding every kind of cause, there can be little doubt that benefit would result if the witnesses were reasonable men." Such a custom is much to be desired, both in the interests of justice and of the medical profession. Medical evidence and certificates are often regarded by the public as "negotiable" matters, and largely questions of price. The removal of this opprobrium rests entirely with the medical profession; the medical man's position, in a legal case, differs widely from that of a lawyer or advocate; this difference cannot be too much insisted upon.

The illustrative cases, especially those dealing with criminal responsibility, given in the work, are most interesting reading.

From the recital of the Hippocratic oath,—the mention of the Roman law that no pregnant woman was allowed to be interred until the child had been extracted from her womb,—

[1] Vide *Lancet*, May 15th, 1915, i. 1036.

Abderhalden's Ninhydrin reaction,—down to the record that hot cross buns caused the illness of over a hundred persons in Inverness, nothing appears to have been omitted that may be of interest or value in a work of this kind.

The illustrations are numerous, and are of real assistance to the student.

The Heart in Early Life. By G. A. SUTHERLAND, M.D. Pp. xvi., 211. London: Oxford Medical Publications. 1914. Price, 6s. net.

Dr. Sutherland has brought three essential qualifications for authorship into co-operation in the writing of this book: wide experience, a critical judgment, and a faculty for setting down his thoughts in a readable form. His basic argument is this, that the disorders and diseases of the heart as seen in early life are distinct in important respects from those of maturer years. In particular it should be noted that the action of the heart in early life is more susceptible of modification by extraneous influences, that it is a growing organ, and that during childhood rheumatic infection is actively and progressively injuring the heart and laying the foundations of the chronic valvular diseases of adult life. To the study of these particular features Dr. Sutherland has applied not only eyes and ears but also the graphic methods of the newer cardiology, but without giving them more prominence than they deserve. No one need fear that the book is too technical to be interesting. It is easily read, and the principles that Dr. Sutherland seeks to emphasise are driven home by suitable examples.

The Inevitable Complement—the Care and After-care of Consumptives. By HAROLD VALLOW, M.D. Pp. viii., 56. London: John Bale, Sons & Danielsson Ltd. 1915.

The chief Clinical Tuberculosis Officer on the Insurance Committee of Bradford gives the results of his experiences gained at a Sanatorium and Dispensary in a large industrial area. He enforces the view that it is necessary to follow up the patients after leaving the institutions in order that the good results shall become permanent, and he writes with the object of pointing out what he considers the best methods for keeping these patients well. The booklet is one to be studied by all tuberculosis officers and those who are joining in the fight against

consumption. This must have the co-operation of all political parties and philanthropists, and the author appeals to all members of the community to insist that the Government shall provide for the people what they have promised under the sanatorium provisions of the National Insurance Act.

Urgent Surgery. By FELIX LEJARS. Translated from the Seventh French Edition by W. S. DICKIE. Pp. xiv., 614. Bristol: John Wright & Co. 1914.

We can repeat our former commendation of the earlier edition. It has the stamp of marked individuality, is very practical, and the illustrations are highly artistic. The addition of chapters on acute dilatation of the stomach, acute pancreatitis, mesenteric obstruction, and sigmoiditis is a welcome one, and we are not surprised that so many editions have been called for. The valvular compression of the cardiac end of the stomach in acute dilatation is well illustrated, as well as the effect of posture in its relief. The routine division of muscle in operations for appendicitis is open to serious criticism, and we would like to see the grid-iron incision illustrated and described in future editions of a book by one who is master of his work.

The Vaccination Question in the Light of Modern Experience. An Appeal for Reconsideration. By C. KILLICK MILLARD, M.D., D.Sc. Pp. xviii., 243. London: H. K. Lewis. 1914. Price, 6s. net.

It 's a long way back to one's school days, but one can just remember

> "Mons parturibat, gemitus immanes ciens
> Eratque in terris maxima expectatio
> At ille murem peperit."

Dr. Millard is patently ingenuous, and has succeeded in proving at some length what no one of experience denies: that vaccination, while it protects the individual for a time, needs repetition to maintain its power of protection, otherwise modified cases occur in the once-vaccinated which may be unrecognised, and thus act as centres of infection. Hence he argues that it were better to deal with *unvaccinated* populations, as then the majority of cases would be clinically recognisable, and the disease more readily controlled. We trust we have not misinterpreted his thesis, and may leave him, until the Day, to enjoy his belief, which we do not share.

Public Health Laboratory Work. By HENRY R. KENWOOD, M.B., F.R.S. Edin. Sixth Edition. Pp. xi., 418. London: H. K. Lewis. 1914. Price, 10s. net.

There is evidence of careful revision throughout in this edition of Professor Kenwood's well-known text-book. The scope of the book is now restricted to the clinical branch of Public Health laboratory work, and the former short résumé of bacteriological work is omitted, thus allowing the chemical work to be dealt with more completely without unduly increasing the size of the book. It is a safe and reliable guide for the Public Health student.

Cunningham's Manual of Practical Anatomy. Sixth Edition. Revised and Edited by ARTHUR ROBINSON. Vol. II. Pp. xxx., 636. London: Henry Frowde and Hodder and Stoughton. 1914. Price 10s. 6d. net.

The rapid appearance of the sixth edition of this manual testifies to its well-deserved popularity. There are a number of new illustrations of varying merit, but the most important new feature lies in the number of reproductions of radiographs of the head and neck and thorax. Radiography has become such an important factor in diagnosis in medicine and surgery, that it becomes necessary that the student should be made familiar with the normal radiographic appearances, for otherwise he can scarcely be expected to diagnose abnormal conditions when engaged in clinical work.

The section on the brain has been very largely re-written, and also contains most of the new illustrations.

The new anatomical nomenclature has, fortunately for the student, not been exclusively adopted, as in nearly every case the old term is bracketed with the new.

Green's Encyclopedia Medica. Second Edition. Vol. I—Abbatoirs to Asphyxia. Pp. xv. 744. Edinburgh and London: Wm. Green & Sons. 1915. Price 20s. net.

This combination of a medical encyclopedia with the medical dictionary was published some fifteen years ago. We then remarked, vol. xxiv., p. 363, that *Green's Dictionary* would be looked upon as a necessary part of the furniture of the consulting room. The general plan of the work is still maintained, the editor being responsible for the dictionarial part of the work, whilst the longer articles are written by the most

eminent specialists in the British Islands. In this, the first volume of the second edition, a complete revision has been made, and every article has been revised by its author or some competent authority. It was found to be impossible to adopt the Basle Anatomical Nomenclature on this occasion, as the terminology of Basle would have been inconvenient both to writers and readers.

The illustrations have been increased in number and improved in quality, whilst the type is excellent and the printing admirable.

The special original articles amount to forty-eight in number, eight of them being under the general heading "Abdomen." These occupy nearly the first hundred pages, and about one-seventh of the whole volume. The names of the authors are a sufficient guarantee of the quality of their work.

Under the heading of "Anatomy" the Basle Anatomical Nomenclature (B.N.A.) is fully detailed in a new article of nearly one hundred pages by Professor Jamieson, of Edinburgh.

A detailed review of a work of this kind is impossible and undesirable; it must speak for itself, and will do so efficiently when consulted by an inquirer after the latest knowledge on the particular subject under the first letter of the alphabet.

Outlines of Zoology. By J. ARTHUR THOMSON, M.A., LL.D. Sixth Edition. Pp. xxi. 885. London: Henry Frowde and Hodder & Stoughton. 1914. Price 12s. 6d.—A new edition of this text-book is always a treat for students of zoology and biology, as it contains in the most readable way all the facts required by the student of zoology, whose outlook is bounded purely and simply by anatomical and developmental facts. It is, moreover, greatly valuable for the student of natural history, as it contains packed away in an unostentatious manner numerous facts connected with the why and the wherefore of animal life. The present edition shows considerable advance on its predecessors in the number of facts dealt with, and also in the new types studied, and especially in the new diagrams, which will be a veritable treat to a large number of students. We congratulate the author on being able, amidst all his other work, to publish such an up-to-date manual, and also on the fact that, in setting things plainly, lucidly, and attractively before his readers, his hand has not lost its cunning.

The Newer Physiology in Surgical and General Practice. By A. RENDLE SHORT, M.D., B.S., B.Sc. Third Edition. Pp. 256. Bristol: John Wright & Sons Ltd. 1914. Price 5s. net.—Within a period of less than three years Dr. Rendle Short has had to bring out three editions of his work. This

proves the necessity for a book dealing with the subjects comprised in it. So many advances have been made in our knowledge since the first edition, that the third now before us has had to be very largely re-written. Hence the alteration in the title from the "New" to the "Newer" Physiology. Entirely new chapters are those on "Vitamines," the "Genital Glands," and "Surgical Shock." The latter embodies Dr. Short's Hunterian Lecture before the Royal College of Surgeons. There are new paragraphs on the dangers of the adrenalin-chloroform combination, and on the functional relations of the ileo-cæcal valve and movements of the stomach. Important additions are made to the chapters on the "Thyroid Gland" and "Physiology of the Spinal Cord," and there are others of perhaps less importance. It is to be hoped that if there be anyone who has escaped reading this little book he will get it without delay, as it cannot fail to be both interesting and instructive to him.

Essentials of Physiology. By F. A. BAINBRIDGE, M.A., M.D., and J. ACWORTH MENZIES, M.D. Pp. viii. 434. London: Longmans, Green & Co. 1914. Price 10s. 6d. This is yet another new text-book of physiology to add to the two American and four English already in common use. It represents the teaching of the Durham school. The main feature is that here we have the briefest (416 pages) of the modern text-books that profess to be adequate for the medical student, nor are the facts set forth in so synoptic a fashion as to rob them of interest. The illustrations are numerous and well-chosen. The authors have displayed a good deal of judgment in their choice of what to include and what to eliminate in the text, and the book is one of the best, if not the best, for students who require no more physiology than they will need to get through a pass examination without overburdening their memories. There are half-a-dozen statements scattered here and there with which your reviewer does not happen to agree (uselessness of dextrose enemata, influence of nervous system on secretion of milk. origin of cholesterin in bile from the blood instead of from gal bladder, nature of secretion of lymph, reducing division ascribed to the first instead of the second formation of polar bodies), but some of these are matters of opinion, and none of them of great importance.

Essentials of Human Physiology. By D. NOËL PATON, M.D. Fourth Edition. Pp. xxiii, 557. London: Longmans, Green and Co. 1914. Price 12s.—A book which has already reached a fourth edition is obviously fulfilling a useful mission. The present volume is brought well up to date. Amongst the more interesting of the new paragraphs may be mentioned Wilson's work on the x-chromosomes, always present in the ovum, but only present in half the spermatozoa. Some embryos, therefore,

start life with two x-chromosomes and become female, whereas others start with only one, and become male. Sex would, therefore, appear to be a matter of luck, which spermatozoon will chance to get there first. Noel Paton's text-book is decidedly smaller than most of its rivals, although it contains a great bulk of facts; it is therefore rather synoptical in parts. The diagrams are of the simplest possible description. Those who find themselves better able to read and appreciate brief, unadorned dogmatic statements than a more detailed, perchance a more interesting, discussion, will find this book very much to their mind.

Elements of Surgical Diagnosis. By Sir A. PEARCE GOULD, K.C.V.O., M.S., F.R.C.S. Fourth Edition. Revised and enlarged by the Author, with the assistance of ERIC PEARCE GOULD, M.A., M.Ch., F.R.C.S. Pp. xiv. 723. London: Cassell and Company Ltd. 1914. Price 10s. 6d.—After a lapse of eleven years a new edition of this well-known manual has been brought out by the distinguished author, assisted by his son. The book thus revised is thoroughly up to date; for instance, it gives skiagrams illustrative of pyelography for various affections of the kidney. It is full, yet simple, concise and eminently practical; it confines itself strictly to the point, which is the utilisation of symptoms, physical signs and special modes of examination in order to make a diagnosis in surgical cases. Although we have perused it with critical care, we did not observe any omissions of importance, except that we think the sigmoidoscope ought to be mentioned in the chapter on diseases of the rectum.

The Operative Treatment of Fractures. By Sir W. ARBUTHNOT LANE, Bart., M.S., F.R.C.S. Second Edition. Pp. 184. London: The Medical Publishing Company Limited. 1914. Price 10s.—The author prefaces his remark by a brief statement of investigations made by him on the changes which the skeleton undergoes from the habitual assumption of attitudes of activity or of rest. These called his attention to the unsatisfactory treatment of fractures with regard to functional results. He illustrates by skiagrams the effectual attempts by Nature, following fracture of long bones in children, to restore the injured bone to its normal form by a process of absorption and deposit of bone, whereby an accurate alignment is obtained. On this he bases his arguments for the operative accurate replacement of fractures, in which even slight deformity exists, uncorrected, not even the clavicle would escape him, and age, he maintains, is no bar. His plate, screws and staples are the mechanical means he employs, the wire is to be shunned almost entirely. The staple he advises in fractures near joints where plate and screw are inapplicable.

The technique is dealt with in detail as of the utmost importance, and rightly so, but one feels that there are others also capable of carrying out such surgery aseptically. With compound fractures he sometimes uses the plate with drainage, but prefers to await perfect healing before its application. No mention is made of after-troubles in the form of pain due directly to the plate, or of sinuses appearing long after an apparently perfect primary union has taken place, necessitating its removal. Other methods, such as fixation by bone or ivory pegs are mentioned, but to be completely condemned, in what appears to be unwarrantable haste, in view of recent work. The book is worthy of perusal as to the results of the author's method which has proved of great value, and is a considerable advance in the treatment of certain fractures, but the ideal fixature is yet to be found.

On Means for the Prolongation of Life. By Sir HERMANN WEBER, M.D. Fourth Edition. Pp x. 235. London: John Bale, Sons & Danielsson, Ltd. 1914. Price 4s. 6d.—No one can be better qualified than the author to speak with authority on this subject, for he says: "Now in my ninety-first year I possess good health and a fair amount of strength, and am able, to some degree, to watch the progress in my old profession, in science and art and social matters, and I still enjoy the beauties of Nature in my country walks, and above all things intercourse with my children and their families and old friends." The book tells us how it has been done, but no matter what our personal aspirations may be—

"There 's many a slip 'twixt cup and lip."

The principal points emphasised by the author are summed up tersely in Shakespearean phraseology:—

"Though I look old, yet I am strong and lusty;
For in my youth I never did apply
Hot and rebellious spirits in my blood,
Nor did not with unbashful forehead woo
The means of weakness and debility,
Therefore my age is as a lusty winter,
Frosty, but kindly."

The Students' Pocket Prescriber. By H. A. HUSBAND, M.B., C.M. Fourth Edition. Pp. 152. Edinburgh: E. & S. Livingstone. 1914. Price 1s. 6d. net.—Contains directions for prescription writing, 487 prescriptions arranged according to the diseases they are intended to cure, the doses being given in imperial and metrical measures, and an appendix of miscellaneous information. As useful as most little books of this class.

The Examination of the Urine. By A. F. HEWAT, M.B., Ch.B. Fifth Edition. Pp. 212. Edinburgh: E. & S. Livingstone. 1914. Price 1s. 6d. net. Contains descriptions

of the methods of examination of urine, blood, sputum, gastric-contents and fæces. It is illustrated and carefully printed, and the methods seem to have been collected from standard works.

The Biology of the Blood-Cells. By O. C. GRUNER, M.D. Pp. xii. 392. Bristol: John Wright & Sons Ltd. 1913. Price 21s. net.—This is not a text-book of hæmatology, but an elaborate study of the origin and development of the various types of cell found in the blood, with special references to the various problems which arise in the clinical study of diseased conditions. The literature has been very fully dealt with, as the long index of authors testifies; and the minute structure of the cellular elements has been studied with an elaboration which is almost bewildering. There is an index of hæmatological terms occupying thirty-three pages, which is of considerable value, and it not only attempts to co-ordinate the various terms used by individual workers, but also defines a number of theories or views in a succinct manner. Thus we find that there are ten synonyms for myeloma, and no less than twenty-four for leucoblast. The book is very fully and beautifully illustrated by photographs and colour prints. It should prove valuable to specialists and advanced students interested in this field of pathology.

The Child's Diet. By J. SADLER CURGENVEN, M.R.C.S. Second Edition. Pp. viii. 115. London: H. K. Lewis. 1914. Price 2s. 6d.—This little book is based on the actual experience of twenty years' general practice. The author gives one chapter to the feeding of infants, the remainder of the book deals with the feeding of older children. The advice given is generally sound, and the recipes at the end of the book will often be found of great assistance to the reader. We do not, however, agree that milk sugar is the best sugar for the bottle-fed infant, in our own experience refined cane is far better. The word "sterilisation" is used rather loosely, "pasteurisation" would more accurately describe the process the author recommends. With these few exceptions the teaching is practical and up to date, and we feel the book will thoroughly serve the purpose for which it has been written.

The "Wellcome" Photographic Exposure Record and Diary, 1915. London: Burroughs, Wellcome & Co. Pp. 280. Price 1s.—This useful little book is a veritable encyclopædia of photography, and gives clear and concise directions for every process. Exposure factors are given for all British and American plates and films, and the ingenious "Wellcome" Exposure Calculator gives the correct exposure for any plate or film at any time of the day or year. The inexperienced amateur will find all the information he seeks, and those more expert will find much that is helpful and suggestive.

The Minor Horrors of War. By A. E. Shipley, Sc.D. Pp. xvii. 166. London: Smith, Elder & Co. 1915. Price 1s. 6d. in paper cover, or 2s. in cloth.—Dr. Shipley has published as a small book his excellent articles which appeared in the *British Medical Journal* during the autumn and winter. The combination of scientific accuracy with a racy style is a refreshing novelty, and enables us to read of these lousy insects of all sorts without arousing the usual desire to scratch. To a sensitive reviewer this quality in such a book exhausts all ordinary terms of praise. The illustrations are works of art, and the type is admirable.

Mechano-Therapeutics in General Practice. By G. de Swietochowski, M.D. Pp. xiv. 141. London: H. K. Lewis. 1914. Price 4s. net.—This is a useful little book written specially for medical men. The author advocates the early use of massage and movements in the treatment of sprains, dislocations and fractures, and gives a clear description of the procedure to be followed in each form of injury. A few simple exercises for the treatment of scoliosis are given. The latter part of the book deals with disorders of the circulatory and respiratory organs suitable for treatment by massage and exercises. The writer points out the advantage, both to themselves and their patients, of medical men acquiring some knowledge of mechano-therapeutics, so as not to leave the treatment entirely in the hands of the more or less ignorant: "more medicine in massage, and more massage in medicine."

Text-Book of Massage. By L. L. Despard. Second Edition. Pp. xix. 413. London: Henry Frowde and Hodder and Stoughton. 1914. Price 12s. 6d. net.—In addition to the valuable subject-matter compiled in the first edition, new chapters on medical exercises and electricity have been added. The book should prove very useful to nurses and others intending to obtain a massage certificate.

Obituary.

HENRY WYNDHAM GOODDEN, Lieut. R.A.M.C.

The news that Henry Goodden had been killed in action near Ypres brought sad regrets to many hearts in Bristol, especially to those who had been his contemporaries and associates at the Royal Infirmary. Owing to his prolonged period of medical study Goodden could claim more than the usual

number of school contemporaries. As he pursued his curriculum, passing from Bristol to Vienna, from Vienna to Paris, and in the intervals, as well as at the end, returning to his Alma Mater, Goodden was the cherished friend and enlivening spirit of successive generations of students.

His manner of studying medicine was stamped with an originality all his own. In no great hurry to acquire a conventional diploma qualifying him to practise, he was an omnivorous learner. By no means a mere memoriser of other men's facts and formulas, he went quietly and leisurely through the pastures of medicine, displaying from his earliest days a shrewd appreciation of values, digesting rapidly and completely, so that what he learned he knew, provided it was worth knowing or learning.

Goodden was born in 1883 at Swindon, Wilts. He was educated at Clifton College and the Bristol Medical School, subsequently at Vienna under Professors Eiselberg, Politzer, and others.

He continued his medical studies in Paris, where he was clinical clerk at the Hôtel Dieu, being the first English student to hold this appointment. He also worked at the Salpétrière Hospital. Unlike the majority of English students, he did not leave his foreign studies and travels to postgraduate days, but entered and attended the usual student curriculum. This he was enabled to do by his great gift of acquiring foreign languages, even Russian not coming amiss to him. After taking his degrees in the University of Bristol, Goodden held several resident posts at the Bristol Royal Infirmary, where the outbreak of the war found him Senior Resident Officer and House Surgeon. He promptly volunteered for service, and was gazetted Lieutenant (temporary) in the R.A.M.C., being attached to the Royal Irish Regiment.

He was present with his regiment at many fierce engagements, and was wounded by shrapnel during the battle of the Aisne, when his life was saved by a silver cigarette case in his left breast-pocket. On another occasion a bullet passed through the front of his cap without touching him.

On May 9th, 1915, he fell on the field of honour.

Colonel S. Moriarty, of the 2nd Battalion Royal Irish Rifles, wrote the following letter describing how bravely he met his death :—

DEAR MR. GOODDEN,

In reply to your letter of 13th, your son was killed north of Ypres. The circumstances were as follows. The battalion was in the trenches and suffering from fire, which was very heavy. In order to look after the men he came up with some shell dressings and did what he could. He left the trench then

Photo, Lizzie Caswell Smith.

HENRY WYNDHAM GOODDEN.

to go back. I endeavoured to dissuade him from doing so. On his way back he was hit I believe in three places, so the orderly who I sent with him states, by Maxim gun. He was buried by another regiment, but so far I have not got the exact spot, but am trying to get it for you. The erection now of a stone is quite impossible, but I am sure that the place is marked, and if I am able later on to do anything I will do so. It may sound as if no care had been taken, but it is a very dangerous spot either by day or night. I miss him more than I can say, and not only myself but we *all* do so. I have forwarded his name for a mention in dispatches, but of course the list is only a regimental one, and may not get through into the general list, as there will be so many names. You would probably like to see what form my recommendation took, so I send you a copy.

I was very fond of your son, and if I may say so, I am most deeply grieved at his death personally, and from a regimental point of view am certain I cannot have another who will in any way approach him from whatever point of view I may look.

I am sending some effects which I hope will arrive safely, and would be glad to hear if they do so.

Please accept all our most deep sympathy in your loss.

I am,
Yours sincerely,
S. MORIARTY.

One of Goodden's contemporaries at the Infirmary, Captain V. B. Green-Armytage, I.M.S., writing from "Somewhere in France," sends the following appreciation of the man as his intimate friends knew him :—

"As one of the Bristol men out here will you let me express through you to his School how deeply grieved I am at Henry Goodden's death. He and I were at Clifton together, and after that joined the old Medical School about the same time. Those were the old happy, haphazard days of the evil-smelling shove-halfpenny students' room, the dim and dingy dissecting-room, with its limpet-like kidneys on the ceiling, and the esoteric melancholy of droning lectures and labs., brought into happy relief by a vivid cricket or football match and its finale, or a Clubs' Union Meeting!

"Henry in those days was always Secretary of everything, and it would have been impossible to find a better. For nimble-witted and keen though he was, his post was no sinecure, it included everything, from buying the tickets to supplying the beer and bailing out delinquents on many an 'out' match, such as Bridgwater. Those were happy days, and Henry's

cheeriness was always his dominant feature, as Pa Davis, Dick Vaughan, Bill Webb, and many another would testify. And then came the old B.R.I., with all its traditions and associations. The old students' room, the garden and the cottage, through all these and other influences Henry passed, picking his way slowly but surely, and losing nothing in knowledge of men and affairs. He had an originality and freedom of expression of his own, and in that he had studied and, above all, kept his eyes and ears open in Vienna and Paris, when at length he settled down and occupied the position of S.R.O. at the B.R.I. his future professional success was assured.

"It was a great pleasure to me, after three months at the front in France, to meet him one day quite casually in January. He was, I found, not the least changed—ever cheery and possessed, and full of his experiences from the time he left the B.R.I. early in August till December. In March and April we met quite frequently, and the last time I was having tea with him in his mess his C.O. spoke very highly of Henry, saying how nearly he had been captured and injured on the Aisne, and how glad he was still to have with them at least one of the original mess that left England in August. His regiment went up then to the Ypres sector, and although I was sent up at the end of April or early in May to lend a hand with the 'gas' and other casualties, I did not see him again. Both he and I had been there before, but this time the fighting has been even greater than in the autumn. I do not know how his end came, but knowing him as I do, and what he was, I am certain he died at his post fearlessly, encouraging and doing his utmost for all till the end. We have all of the old B.R.I. lost a great friend, and the profession a good man. Out here with his regiment and at home with you his name and what he stood for will be remembered long."

Local Medical Notes.

Royal Mineral Water Hospital, Bath.—The number of invalided soldiers treated in this hospital are: British soldiers, 301; Belgian soldiers, 110.

The first case was admitted on September 28th.

The hospital was offered to the War Office for the reception of sick and wounded, but was accepted for such cases only as require the bath treatment.

Cases admitted include fibrositis, arthritis, rheumatism, rheumatic myositis, sciatica, frost-bite, muscular wasting due

to wound, neurasthenia, muscular strain, and the after-effects of wounds.

The number of beds is 150. The average number of soldiers recently over 100.

Massage has been largely used and with success, also ionisation.

Sanatorium Work in Bristol.—For the following report we have to thank our Medical Officer of Health, Dr. D. S. Davies.

The complete Tuberculosis Scheme for the City of Bristol adopted by the Council on 22nd July, 1913, included—

A. Dispensaries—Two. (*a*) 19 Portland Square.
(*b*) 4 Redcliffe Parade West.

B. Sanatoria and Hospitals.

(*a*) Sanatoria. (1) Winsley—50 beds for early cases.
(2) Ham Green—40 beds.[1]

(*b*) Hospitals. Ham Green—20 beds.[1]

The Scheme was to be administered under the general administrative supervision of the Medical Officer of Health by—

1. Tuberculosis Officer, who would assume general clinical control of the City Dispensaries and of all Tuberculosis work in the City, and would act as adviser in Tuberculosis work of the Insurance Committee.

2. Resident Medical Officer at Ham Green, in clinical charge of the Hospital and Sanatorium at Ham Green.

3. An Assistant Medical Officer for Sanatorium and Dispensary work.

In the early part of 1914 the Scheme had considerably advanced :—

A. Dispensaries.

The Redcliffe Dispensary was the first to be opened, having been taken over from the Civic League in January, 1913. During the two years 1912–13 the number of new patients seen at this Dispensary was 1,581, and the number of attendances of patients amounted to 14,861.

The Portland Square Dispensary, opened in May, 1914, is larger and more completely equipped than the original home, and includes a pharmacy, a laboratory and three observation beds for special cases, also accommodation for a nurse, as well as the usual waiting and consulting rooms.

MEDICAL STAFF.

Considerable dislocation of work has been caused by the outbreak of war in August. The Tuberculosis Officer (Dr. Faill) and the Assistant Medical Officer (Dr. Galpin) have both been called away on active service, and Dr. Hill is now Acting

[1] For all classes of suitable cases and after-care cases.

Tuberculosis Officer, with Dr. Penny as Assistant Medical Officer.

With the opening of the Portland Square Dispensary two extra nurses were added to the staff, making a total of four.

One of the Tuberculosis nurses has also left on war service, necessitating the making of a temporary appointment.

The number of new cases attending the Dispensaries during the year 1914 was 991, a considerable increase on the 696 during the year 1913. The subsequent visits during the year numbered 9,850.

B. Sanatoria.

Until the completion of the Sanatorium and Hospital beds now in course of erection at Ham Green, the accommodation available will not amount to the full figures of the Scheme.

At present there are available and in use at

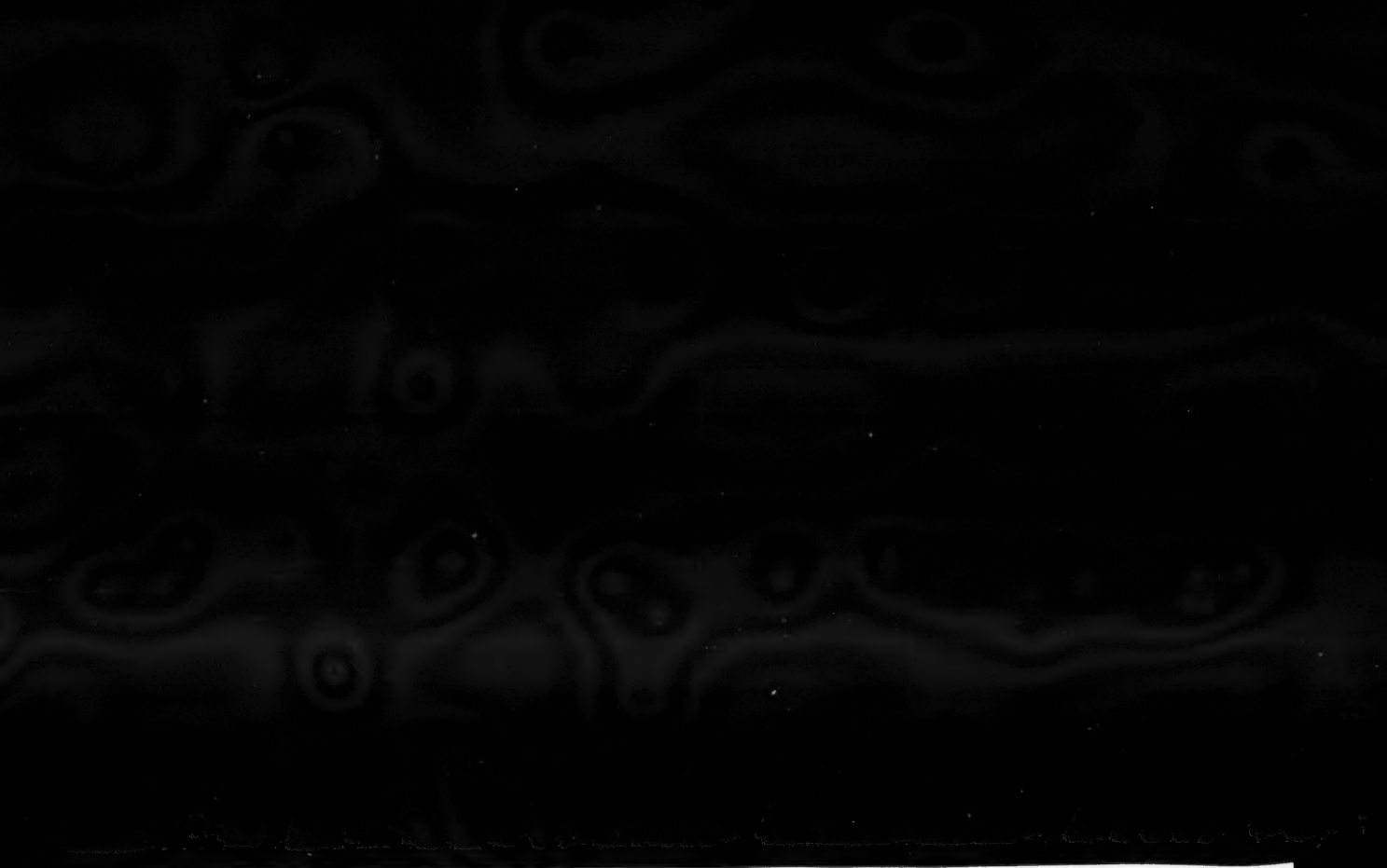
Winsley	50
Ham Green	20
Clift House (advanced cases)	28

The Ham Green Sanatorium beds are provided in temporary shelters, viz. :—

One	for 16	patients.
One	for 9	,,
Seven single shelters	for 7	,,
Part of permanent Fever Block	for 8	,,
	40	

but at present (May, 1915), owing to the fever necessities of war time, the number accommodated has had to be limited to 20, and when the first part of the new Sanatorium buildings are completed these will have to be temporarily devoted to the same service.

Clift House Hospital has afforded useful temporary accommodation for 28 advanced cases, but these premises will shortly be demolished for Dock purposes, and by that time it is hoped that the Hospital buildings for late cases at Ham Green will be available for use.

The number of Sanatorium and Hospital cases dealt with during the year 1914 are here shown :—

	Male.	Female.	Total.
Winsley	85	41	126
Ham Green	29	73	102
Clift House	44	51	95
	158	165	323